ACTION TEAM PROGRESS REPORT

Remote Sensing

Date: September 2006

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Issue 1: Remote Imaging for Leak Detection and Repair

Environmental Problem:
States are having problems identifying the sources of emissions that are causing elevated reading of VOC's that can lead to higher ozone and non compliance with the CAA. States that are in not in compliance with the CAA due to higher than allowed levels of criteria pollutants must develop State Implementation Plans to come back into compliance. The States base these plans on an environmental inventory of known sources of pollutants.

Technology Challenges:
In a heavily industrialized area there can be tens and hundreds of thousands of components that could leaking and be causing elevated readings at community monitoring networks. These components can be difficult to monitor and thereby it is difficult to detect which are the source of the problems. In some cases the emissions can be coming from sources not considered as part of an emission inventory. Traditional monitoring is also expensive and time consuming when applied to a large area like a county. A way is needed to quickly and more efficiently identify sources that cause non compliance with the CAA.

FY'06 Accomplishments:
Region 6 was able to do several demonstration projects in conjunction with RTP, R4, the States of Louisiana, Arkansas and Tennessee to show that optical imaging and in particular a portable infrared camera could be used to detect emissions when mounted in a helicopter and used on the ground. One of the unexpected results was the discovery of emissions from barges. This was a significant discovery in that barges travel long distances along water ways and can cause pollution over a wide area where they travel. Floating roof tanks were also discovered to be a larger source of emissions then expected.

The States have started working with industry to alert them of the problems with leaks from tanks and implement solutions. EPA is in the process of promulgating a rule to allow the use of optical imaging for Leak Detection and Repair.
ORD, as part of a Region 6 RARE grant, worked on developing a capability to quantify gas leaks utilizing optical imaging technologies. This system will be used in an upcoming refinery test in Baytown, TX.
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FY'07 Objectives:
In October of 2006 there will be a meeting with several States, Regions, the Coast Guard County Health Department, two major barge companies and EPA's OTAQ to begin discussions on how to voluntarily reduce emissions from barges. Emissions from barges, no doubt a national problem, were discovered through remote imaging. The participating entities will hope to have solutions sometime in 2007.

The gas quantification system, although a research grade instrument, will be operational by FY07. ORD expects to field the instrument at the request of the Regions and Programs for a variety of gas leak surveys.

Issues:
Like most projects funding has not been plentiful. Follow up studies are needed and for most people trying to develop remote sensing for environmental use is a sideline and not part of normal assigned work.

Issue 2: Optical Remote Sensing for Non-point emissions

Team Leader: Robin Segal (OAR)

Environmental Problem:
Determining the location of hot spots that contribute to non-point sources of emissions is difficult using traditional stationary air samplers.

Technology Challenges:
Spatially resolving sources of gaseous emissions requires the use of open path FTIR systems deployed in multiple beam configurations. Utilizing this approach and integrating wind data, a computer tomography technique is applied to identify emission hot spots and measure emission flux over a large area.

FY'06 Accomplishments:
Posted a new protocol on Emission Measurement Center website entitled "Optical Remote Sensing for Emissions Characterization from Non-point Sources." This protocol provides methodologies for characterizing gaseous emissions from non-point pollutant sources. The methodologies in the protocol rely on use of open-path, path-integrated optical remote sensing in a multiple beam configurations to directly identify emissions "hot spots" and measure emission fluxes (see http://www.epa.gov/ttn/emc/prelim.html). Supporting information for the protocol is shown in the associated "Supporting Information" table.

FY'07 Objectives:
The dissemination this protocol for others to use via the website. Potentially expanding the available methodologies in the protocol based on user feedback.

Issues:

Issue 3: Verification of remote imaging devices for use in industrial leak detection and repair programs (LDAR)

Project Officer: David J. Williams (ORD)

Environmental Problem:
Emissions from petroleum and chemical plants can impact regional air quality. Industrial leak detection and repair programs are time consuming and expensive to operate. The practices often fail to detect large leaks or non-traditional emission sources.

Technology Challenges:
Remote sensing technologies for LDAR are being utilized by industry and government regulators. However, the performance of these technologies has not been verified. Without this verification, the results obtained from using these technologies become suspect.

FY'06 Accomplishments:
ORD's Environmental Sciences division has been awarded internal funding to develop a test plan to verify these technologies. A testing plan and quality assurance plan is currently being prepared.

FY'07 Objectives:
Testing of these technologies will be carried out in mid-FY07. A verification report will be published for use by the stakeholders.

Issues:
Cost effective technologies that can be used to detect a broad array of emissions has yet to be commercialized. EPA should invest in the research area since the payoff in terms of reduced emissions and human health improvement is large.

Issue 4: Database of EPA Remote Sensing Projects

Project Officer: Paul Shapiro (ORD)

Environmental Problem:
When the Action Team first met, everyone realized that no one had an overview of all the remote sensing activities in EPA. It was agreed that a database would be created into which information about EPA remote sensing projects would be entered. It was apparent that this information would be useful for States and other external parties.

Technology Challenges:
It was necessary to create a questionnaire that could be sent to EPA staff to enter information about their remote sensing projects. The questionnaire had to be short enough that people would be willing to fill it out, yet comprehensive enough to cover the wide range of remote sensing activities in the Agency—e.g., technology development, data collection and analysis, utilization for enforcement, etc. The database would have to be easily searchable to find information to meet the needs of EPA staff who might, for example, want to know whether a certain type of remote sensing activity had been carried out in a particular part of the country or what types of remote sensing technologies have been used for certain purposes and who in the Agency has used them.

FY'06 Accomplishments:
The co-chairs worked with ETC staff to develop and pre-test the questionnaire, to develop the database, and to create the functions to enable easy sorting and searching of the questionnaire responses in the database. Provision was made for a basic level of quality control of the responses. In addition the capability was created for States and others to access the information in the database. ORD/NCER provided contractor support for the questionnaire and database development, for quality control, and for enabling web access. The EPA Remote Sensing (EPARS) questionnaire and database are accessible at the following URL: **http://cfpub.epa.gov/EPARS/**.
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FY'07 Objectives:
The main objective for FY07 is to populate the database. The Action Team members can begin to fill out questionnaires to put in the database information about their projects. The members can also publicize the existence of the database to their EPA colleagues who have remote sensing projects and encourage them to fill out a questionnaire for each of their projects. The public will be given access to the database once there is a critical mass of project information in the database.

Issues:
The primary issues are how to have as many EPA staff who are the Technical Project Officers for remote sensing projects enter information about their for projects in the database, how to encourage and enable EPA staff to utilize the database, and how much project information is necessary in the database before it is made available to the public.